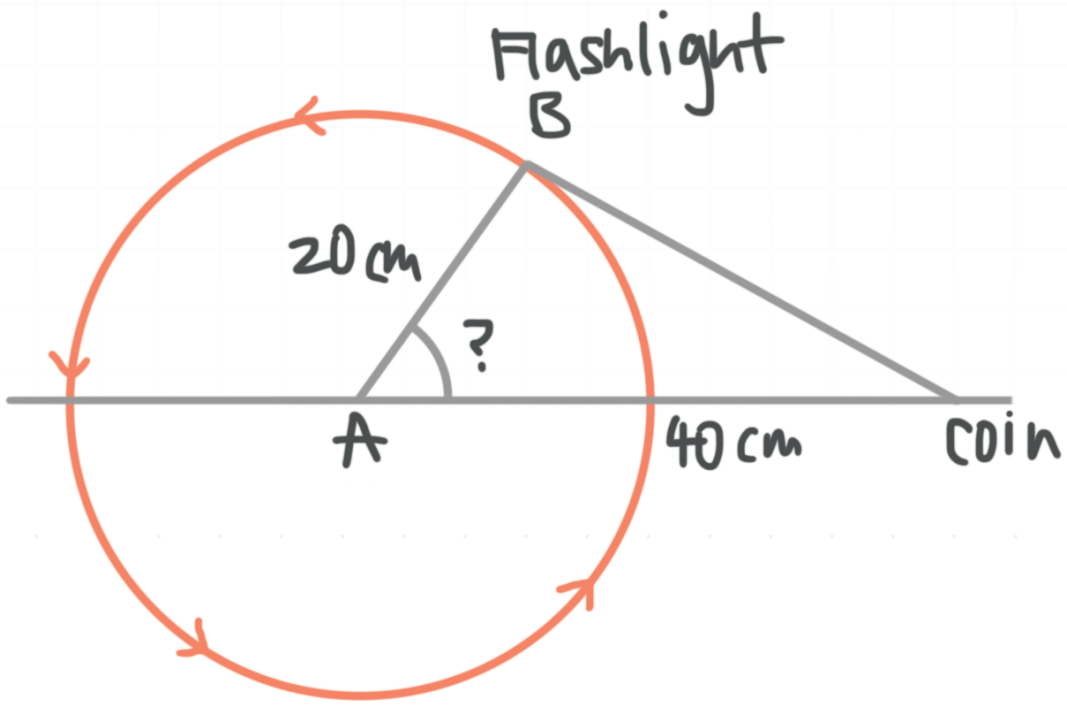
Trigonometry Workbook

Inverse trig functions

krista king MATH

INVERSE TRIG RELATIONS

■ 1. A stick AB of length 20 cm rotates counterclockwise about the endpoint A with a constant speed, and makes one revolution every 20 seconds. A laser flashlight is fixed on the endpoint B of the stick, in such a way that the light shines orthogonally to the stick. A coin is placed 40 cm directly to the right of A. Find the set of all possible values of θ between the stick and the line that connects A to the coin, such that the flashlight points exactly to the coin.



■ 2. A beacon is anchored to the seabed such that it can move freely only in the vertical direction. Because of waves, the beacon's altitude with respect to the ground is changed periodically and can be modeled by $h(t) = 16 + 0.8\cos(0.4t)$, where t is time in seconds. Find the moments in time when the distance from the beacon to the seabed is the largest.

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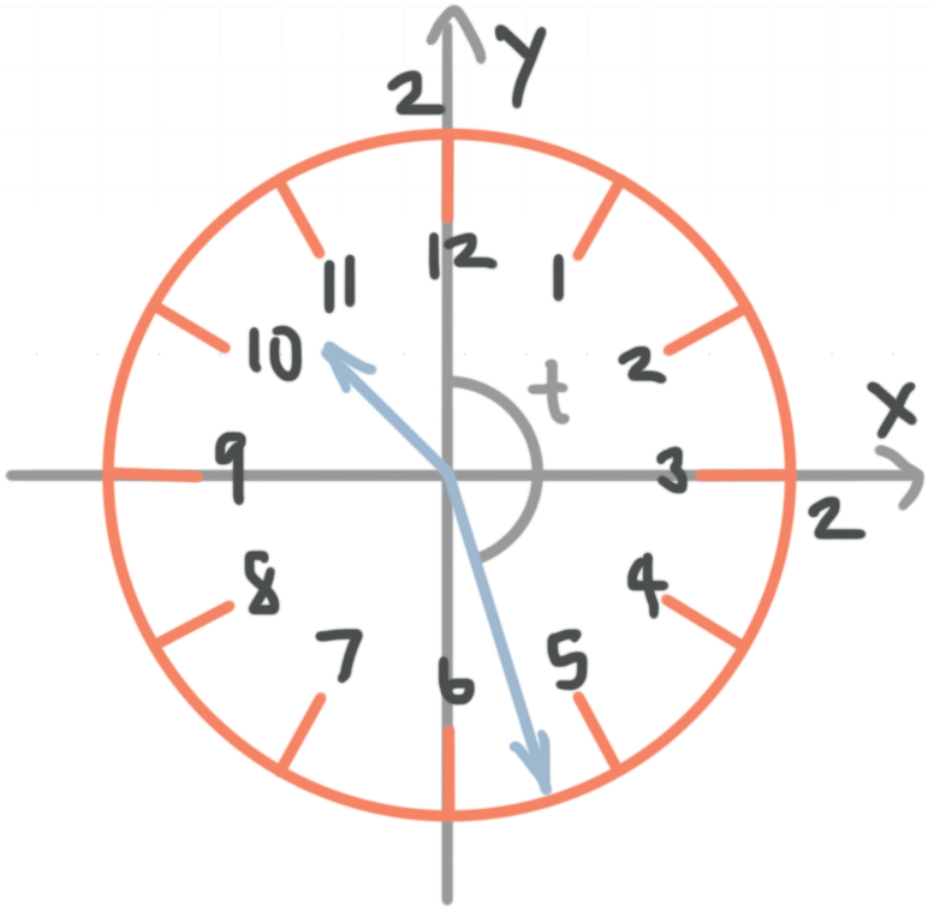
■ 3. The minute hand of a 12-hour clock makes one revolution every hour, and has a length of 2 cm. Find the equations of $x(t)$ and $y(t)$ that model the minute-hand motion in the form

$$x(t) = a\sin(bt)$$

$$y(t) = a\cos(bt)$$

where t is the angle between the minute hand and 12 h direction, and $x(t)$, $y(t)$ are the coordinates of the minute hand endpoint with respect to the center of the clock dial. Then find the set of all possible values of time when $x(t) = 1$.



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GRAPHS OF INVERSE TRIG RELATIONS

1. Sketch the graph of the inverse relation for the function.

$$f(x) = 2\sin(x - \pi) + 1$$

2. Sketch the graph of the inverse relation for the function.

$$f(x) = \frac{1}{2}\csc\left(x + \frac{\pi}{2}\right) - 1.5$$

3. Sketch the graph of the inverse relation for the function.

$$f(x) = \frac{1}{\sqrt{3}}\tan\left(\frac{\pi}{3}x - \frac{\pi}{3}\right) + 2$$

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FINDING THE VALUE OF AN INVERSE TRIG FUNCTION

■ 1. Prove the identities or give a counterexample to show that they're not true.

$$\tan^{-1} a = \frac{\sin^{-1} a}{\cos^{-1} a}$$

$$\cot^{-1} a = \frac{\cos^{-1} a}{\sin^{-1} a}$$

$$a \in [-1,1]$$

■ 2. Write down the exact solution of the equation using inverse trig functions.

$$5\sin(x-4) - 3 = 0$$

■ 3. Find the domain and range of $f(x)$.

$$f(x) = 4\sin^{-1}(2x-1) + 3\pi$$

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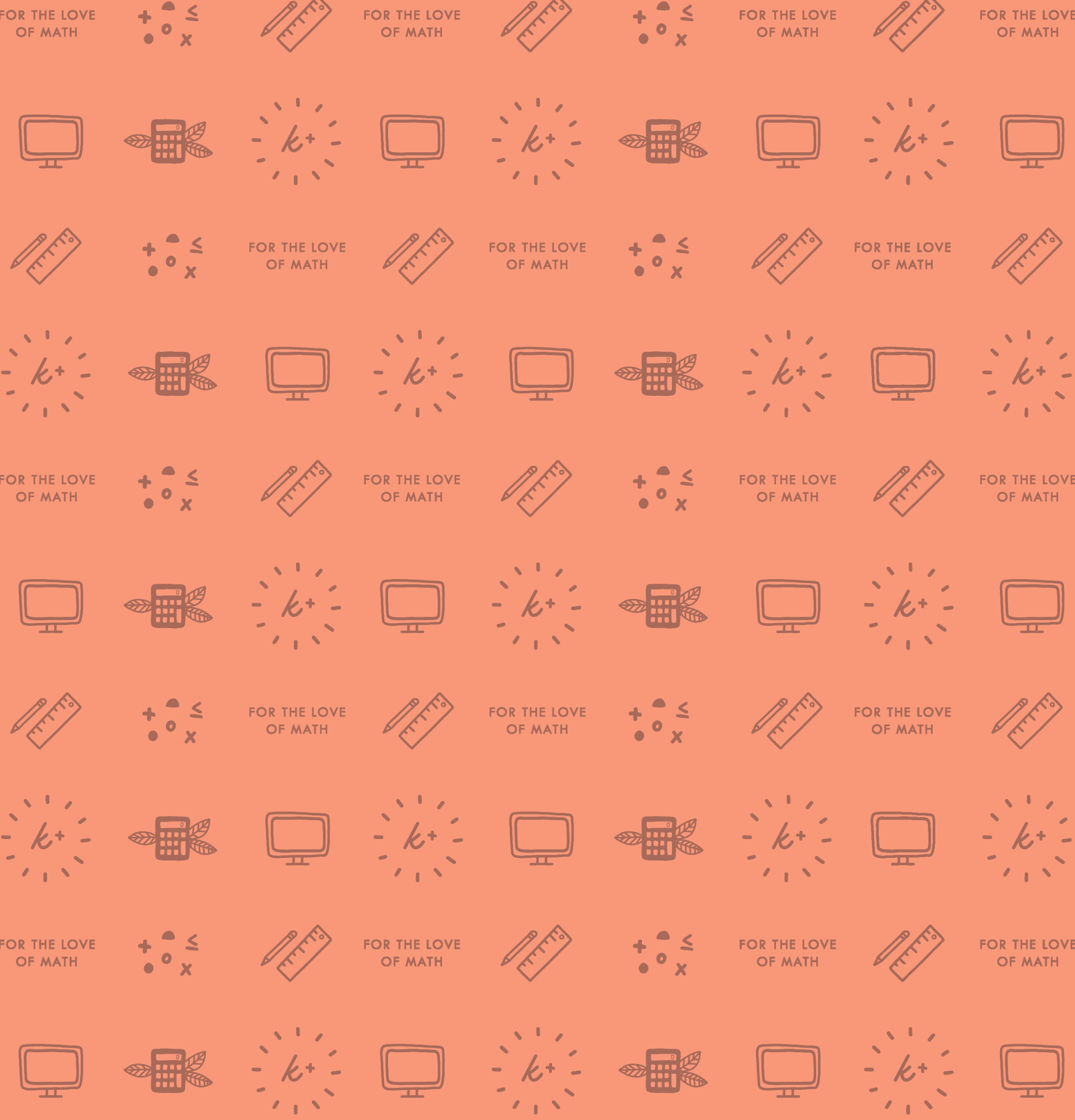
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